Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

NATIONAL GUIDELINE CLEARINGHOUSE

General

Guideline Title

Knee disorders.

Bibliographic Source(s)

Knee disorders. In: Hegmann KT, editor(s). Occupational medicine practice guidelines. Evaluation and management of common health problems and functional recovery in workers. 3rd ed. Elk Grove Village (IL): American College of Occupational and Environmental Medicine (ACOEM); 2011. p. 1-503. [2243 references]

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Knee complaints. Elk Grove Village (IL): American College of Occupational and Environmental Medicine (ACOEM); 2004. 31 p. [87 references]

Regulatory Alert

FDA Warning/Regulatory Alert

Note from the National Guideline Clearinghouse: This guideline references a drug(s) for which important revised regulatory and/or warning information has been released.

- March 22, 2016 – Opioid pain medicines : The U.S. Food and Drug Administration (FDA) is warning about several safety issues with the entire class of opioid pain medicines. These safety risks are potentially harmful interactions with numerous other medications, problems with the adrenal glands, and decreased sex hormone levels. They are requiring changes to the labels of all opioid drugs to warn about these risks.

Recommendations

Major Recommendations

Definitions for the strength of evidence ratings (A, B, C, and I) and the criteria for evidence-based recommendations are presented at the end of the "Major Recommendations" field.

Summary Tables: Recommendations and Evidence

Table 1 is a summary of the recommendations from the Evidence-based Practice Knee Panel for diagnostic testing for knee disorders. Table 2 is a summary of recommendations for managing these disorders. Table 3 is a summary of pre-, peri-, and post-operative rehabilitation recommendations related to these disorders. Recommendations are based on critically appraised higher quality research evidence and on expert consensus observing First Principles when higher quality evidence was unavailable or inconsistent. The reader is cautioned to utilize the more detailed indications, specific appropriate diagnoses, temporal sequencing, prior testing or treatment, and contraindications that are elaborated in more detail in the body of this Guideline in using these recommendations in clinical practice or medical management. These recommendations are not simple "yes/no" criteria, and the evidence supporting them is in nearly all circumstances developed from typical patients, not unusual situations or exceptions.

Recommendations are made under the following categories:

- Strongly Recommended, "A" Level
- Moderately Recommended, "B" Level
- Recommended, "C" Level
- Insufficient-Recommended (Consensus-based), "I" Level
- Insufficient-No Recommendation (Consensus-based), "I" Level
- Insufficient-Not Recommended (Consensus-based), "I" Level
- Not Recommended, "C" Level
- Moderately Not Recommended, "B" Level
- Strongly Not Recommended, "A" Level

Table 1. Summary of Recommendations for Diagnostic and Other Testing for Knee Disorders

Test	Recommendation(s)
Antibodies	Antibody levels to evaluate and diagnose patients with knee pain who have reasonable suspicion of rheumatological disorder – Recommended, Insufficient Evidence (I). However, ordering of a large, diverse array of antibody levels without targeting a few specific disorders is not recommended. Antibody levels to confirm specific disorders (e.g., rheumatoid arthritis) – Strongly Recommended, Evidence (A)
Knee Arthroscopy	Arthroscopy to evaluate and diagnose patients with knee pain if they have suspicion of clinically significant meniscal tear, intra-articular body, and other subacute or chronic mechanical symptoms and have an equivocal or inconclusive magnetic resonance imaging (MRI) – Recommended, Insufficient Evidence (I) Arthroscopy for diagnosing acute knee pain, other than large meniscal tears, cruciate tears or intra-articular bodies – Not Recommended, Insufficient Evidence (I) Arthroscopy for staging a surgical procedure – Recommended, Insufficient Evidence (I) Arthroscopy for diagnosing patients with acute, subacute, or chronic osteoarthrosis in the absence of a remediable mechanical defect such as clinically significant, symptomatic meniscal tear – Not Recommended, Insufficient Evidence (I)
Bone Scans	Bone scanning for select use in patients with acute, subacute, or chronic pain to assist in diagnosing osteonecrosis, neoplasms, or other conditions with increased polyostotic bone metabolism, particularly where more than one joint needs to be evaluated – Recommended, Insufficient Evidence (I) Bone scanning for routine use in knee joint evaluations as it is generally thought to be inferior to MRI – Not Recommended, Insufficient Evidence (I)
Computerized Tomography (CT)	Routine CT for evaluating acute, subacute, or chronic knee pain – Not Recommended, Insufficient Evidence (I) CT for evaluating patients with osteonecrosis or for those who need advanced imaging, but have contraindications for MRI – Recommended, Insufficient Evidence (I)

Test	Recommendation(s)
	CT for evaluating patients with total knee arthroplasty patients with potential periprosthetic osteolysis – Recommended, Insufficient Evidence (I)
C-Reactive Protein, Erythrocyte Sedimentation Rate, and Other Non-Specific Inflammatory Markers	Erythrocyte sedimentation rate and other inflammatory markers to evaluate for inflammatory disorders or prosthetic sepsis when there is a reasonable suspicion of an inflammatory disorder in patients with subacute or chronic knee pain – Recommended, Insufficient Evidence (I). However, ordering a large, diverse array of inflammatory markers without targeting specific disorders for which there is clinical suspicion is not recommended.
Local Anesthetic Injections and Epidurals	Local anesthetic injections to assist in diagnosing subacute or chronic knee pain – Recommended, Insufficient Evidence (I)
Electromyography (Including Nerve Conduction Studies)	Electrodiagnostic studies to assist in diagnosing subacute or chronic peripheral nerve entrapments – Recommended, Insufficient Evidence (I)
Magnetic Resonance Imaging (MRI)	MRI for select patients with subacute or chronic knee symptoms in which mechanically disruptive internal derangement or similar soft tissue pathology is a concern (generally not indicated for acute knee pain) – Recommended, Insufficient Evidence (I) MRI for diagnosing osteonecrosis – Recommended, Insufficient Evidence (I) MRI for routine evaluation of acute, subacute, or chronic knee joint pathology, including degenerative joint disease – Not Recommended, Insufficient Evidence (I) MRI in more severe cases of quadriceps, gastrocnemius, or soleus strains for evaluating the underlying bony structure as well as the degree of muscle tear – Recommended, Insufficient Evidence (I) MRI for evaluation of knee sprains, particularly to rule out fracture – Recommended, Insufficient Evidence (I) MRI for anterior cruciate ligament (ACL) tears, particularly if there are concerns for other soft tissue damage including meniscal tears and other sprains – Recommended, Insufficient Evidence (I). However, some cases may also be managed clinically without MRI. MRI in more severe cases of meniscal tears, including cases involving significant trauma, particularly to rule out fracture. MRI is also helpful for defining other injuries that may accompany tears such as cruciate and other ligament tears – Recommended, Insufficient Evidence (I) MRI for evaluation of patellofemoral joint pain – No Recommendation, Insufficient Evidence (I)
Magnetic Resonance (MR) Arthrogram	MR arthrograms for select patients requiring advanced imaging of the menisci and articular cartilage or following procedures such as chondrocyte implantation – Recommended, Insufficient Evidence (I)
Roentgenograms (X-rays)	X-ray for evaluating acute, subacute, or chronic knee pain – Recommended, Insufficient Evidence (I) X-ray for diagnosing fracture – Recommended, Insufficient Evidence (I) X-ray for diagnosing osteonecrosis – Recommended, Insufficient Evidence (I) X-ray in more severe cases of quadriceps, gastrocnemius, or soleus strains for evaluating underlying bony structure as well as the degree of muscle tear – Recommended, Insufficient Evidence (I) X-ray for evaluating knee sprains, particularly to rule out fracture – Recommended, Insufficient Evidence (I) X-ray for many cases of ACL tears, particularly accompanying trauma, to rule out fractures – Recommended, Insufficient Evidence (I) X-ray in more severe cases of meniscal tears, including cases involving significant trauma, particularly to rule out fracture – Recommended, Insufficient Evidence (I)

Test	Recommendation(s)
	X-ray to rule out osteomyelitis or joint effusion in cases of significant septic knee bursitis – Recommended, Insufficient Evidence (I) X-ray for evaluation of patellofemoral joint pain – Recommended, Insufficient Evidence (I)
Saline Load Test	Saline load test for select patients with knee lacerations that may have penetrated the joint – Recommended, Insufficient Evidence (I)
Ultrasound	Ultrasound for evaluating patients with patellar tendinopathy, pes anserine bursitis, hamstring strains, quadriceps strains, or post-arthroplasty chronic pain, where peri-articular masses are suspected – Recommended, Insufficient Evidence (I) Ultrasound for evaluating other knee disorders, including osteonecrosis, osteoarthrosis, dysplasia, or fractures – No Recommendation, Insufficient Evidence (I) Ultrasound for evaluation of knee sprains – No Recommendation, Insufficient Evidence (I) Ultrasound for evaluation of ACL tears – No Recommendation, Insufficient Evidence (I) Ultrasound for evaluation of meniscal tears – No Recommendation, Insufficient Evidence (I) Ultrasound for evaluation of patellofemoral joint pain – No Recommendation, Insufficient Evidence (I)
Fluid Aspiration	Aspiration of the fluid and analyses including Gram stain and culture and sensitivity to evaluate for septic bursitis in patients with suspected infection – Recommended, Insufficient Evidence (I)

Table 2. Summary of Recommendations for Managing Knee Disorders

Knee Disorder	Treatment with Evidence Rating/Recommendation Level		
	Recommended	No Recommendation	Not Recommended
Acute, Subacute, or Chronic Knee Pain	Canes and crutches for moderate to severe acute knee pain or subacute and chronic knee pain when device is used to advance activity level (I) Activities that do not substantially aggravate symptoms for most patients (I) Bed rest and/or non-weight bearing for those with clear contraindications for weight-bearing such as unstable fracture (I) Non-steroidal anti-inflammatory drugs (NSAIDs) for chronic knee pain (A) NSAIDs for acute flares (C) NSAIDs for acute or subacute knee pain (I) Acetaminophen for knee pain, particularly for those with contraindications for NSAIDs (C) Concomitant prescriptions of cytoprotective medications (proton pump inhibitors or misoprostol) for patients at substantially increased risk for gastrointestinal bleeding (A)	Yoga for chronic knee pain (I) Magnets and magnetic stimulation (I) Muscle relaxants for acute and subacute, moderate to severe knee pain from muscle spasm that is unrelieved by NSAIDs, avoidance of exacerbating exposures, or other conservative measures; generally not indicated for chronic knee pain (I) Norepinephrine reuptake inhibiting anti-depressants for subacute or chronic knee pain (I) Topiramate for subacute or chronic knee pain (I) Gabapentin for subacute or chronic knee pain (I) Willow bark (Salix), ginger extract, rose hips, Camphora molmol, Melaleuca alternifolia, Angelica sinensis, Aloe vera,	Bed rest and non-weight bearing (I) Routine use of opioids for acute, subacute and chronic nonmalignant pain conditions (C) Norepinephrine reuptake inhibiting anti-depressants for acute knee pain (I) Selective serotonin reuptake inhibitors (SSRIs) for acute, subacute, or chronic knee pain (I) Topiramate for acute knee pain (I) Gabapentin for acute

Knee Disorder	Treatment with Evidence Rating/Recommendation Level		
	Recommended	No Recommendation	Not Recommended
	Concomitant prescriptions of cytoprotective medications (H2 blockers) for patients at substantially increased risk for gastrointestinal bleeding (C) Patients with known cardiovascular disease or multiple risk factors for cardiovascular disease should be counseled about the risks and benefits of NSAID therapy. (I) Acetaminophen or aspirin should be considered as first-line therapy for patients with cardiovascular disease risk factors. (A) Acetaminophen particularly for those with contraindications for NSAIDs (C) Judicious use of opioids for acute severe knee pain (I) Opioids for select patients with subacute or chronic knee pain (I) Selective serotonin reuptake inhibitors (SSNRIs), SSRIs, and/or tricyclic antidepressants for patients with chronic knee pain with co-morbid depression (C) Cryotherapies for home use if efficacious for temporary relief (I) Self-application of low-tech heat therapy (I) Manipulation or mobilization for subacute or chronic knee pain (C) Percutaneous electric therapy (I) Psychological evaluation as part of evaluation/management of patients with chronic knee pain with any of the indications listed in this chapter (I) Cognitive behavioral therapy as an adjunct to an interdisciplinary program for subacute or chronic knee pain (I) Work conditioning, work hardening, and early intervention programs for chronic knee pain (I) Multi-disciplinary or interdisciplinary program with a focus on behavioral or cognitive-behavioral approaches combined with conditioning exercise for select patients with chronic knee pain who demonstrate partial or total work incapacity (I)	Thymus officinalis, Menthe piperita, Arnica montana, Curcuma longa, Tanacetum parthenium, and Zingiber officinale, avocado soybean unsaponifiables, oral enzymes, topical copper salicylate, S-Adenosylmethionine, and diacerein harpagoside (I) Massage (I) Acupuncture for acute or subacute knee pain (I) Manipulation or mobilization for acute knee pain (I) Electrical stimulation therapies (I) Iontophoresis (I) Yoga for chronic knee pain (I) Transcutaneous electrical stimulation (TENS) (I) Botulinum injections (I) Biofeedback for chronic knee pain (I)	knee pain (I) Tumor necrosis factor-alpha blockers (I) Complementary or alternative treatments or dietary supplements, etc. (I) Pulsed electromagnetic fields (I) Reflexology (I) Low-level laser therapy (C) Prolotherapy injections (C)

Knee Disorder	Treatment with Evidence Rating/Recommendation Level		
Knee Osteoarthrosis	Aerobic exercise (A) Stretching exercises for select patients with significant reductions in range of motion that are not thought to be fixed deficits (I) Strengthening exercises (B) Educational sessions to help facilitate treatment (I) A trial of aquatic therapy for patients who meet the referral criteria for supervised exercise therapy, have co-morbidities (e.g., extreme obesity, significant degenerative joint disease, etc.) that preclude effective participation in a weight-bearing physical activity, and are planned to transition either to a land-based program or a self-administered water-based program (I) Off-loader braces for select patients with medial joint osteoarthrosis (C) Knee braces (e.g., unloader braces) for moderate to severe chronic knee pain due to osteoarthrosis that is largely or totally unicompartmental (C) Motorized scooters for highly selected patients with severe chronic knee pain due to osteoarthrosis (I) Cryotherapies for home use if efficacious for temporary relief (I) Self-application of low-tech heat therapy (I) Acupuncture for select use for chronic osteoarthrosis of the knee as an adjunct to more efficacious treatments (B) Percutaneous electric therapy (C) Intra-articular knee viscosupplementation injections for moderate to severe knee osteoarthrosis (I) Intra-articular glucocorticosteroid injections for knee osteoarthrosis especially for short-term control of symptoms (C) Knee arthroplasty for severe arthritides (A) Unicompartmental arthroplasty for largely unicompartmental disease (C) Simultaneous bilateral knee replacement for carefully selected patients with bilateral disease (C)	Knee braces (e.g., unloader braces) for all other osteoarthrosis, including symmetrical osteoarthrosis (OA) (I) No Recommendation Neoprene knee sleeves for moderate to severe chronic osteoarthrosis (I) Magnets and magnetic stimulation (I) Norepinephrine reuptake inhibiting anti-depressants (I) Topiramate (I) Gabapentin (I) Glucosamine sulfate 1,500 mg daily (single or divided dose), chondroitin sulfate, or methylsulfonylmethane for treatment (I) Glucosamine sulfate intra-muscular injections (I) Glucosamine sulfate intra-articular injections (I) Glucosamine sulfate, chondroitin sulfate, or methylsulfonylmethane for prevention (I) Diacerein (I) Ultrasound (I) Massage (I) Manipulation or mobilization (I) Electrical stimulation therapies (I) Iontophoresis (I) TENS (I) Intramuscular glucocorticosteroid injections (I) Tidal knee joint irrigation (I) Botulinum injections (I)	Arthroscopy for treatment in patients with acute, subacute, or chronic osteoarthrosis in the absence of a remediable mechanical defect such as clinically significant, symptomatic meniscal tear (I) Orthoses (lateral wedges for medial joint disease) for moderate to severe chronic knee pain due to osteoarthrosis (B) Tumor necrosis factor-alpha blockers (I) Sleeves (B) Lateral wedges for medial compartment knee osteoarthrosis (B) Pulsed electromagnetic fields (I) Phonophoresis (C) Reflexology (I) Low-level laser therapy (C) Radiation synovectomy (C) Chondroplasty and debridement (B)
Iliotibial Band Syndrome	NSAIDs (I) Glucocorticosteroid injections in a subset of patients with insufficient results from other	Transverse friction massage (I) Phonophoresis (I) Surgery (I)	Knee immobilization (I)

Knee Disorder	Treatment with Evidence Rating/Recommendation Level		
Quadriceps, Gastrocnemius and Soleus Strains	Work limitations for those with quadriceps, gastrocnemius, or soleus strains performing high physical demand tasks or those who have no ability to avoid repeating physically demanding job tasks thought to have resulted in condition (I) NSAIDs (I) Ice and/or heat (I) Ace wraps (I) Course of rehabilitation therapy for those with persisting pain (I) PATS – Progressive agility, trunk stabilization and icing (C)	Work limitations for other cases of quadriceps, gastrocnemius, or soleus strains No Recommendation (I)	Bed rest – relative rest may be required for many patients (I) Not Recommended
Knee Sprains	Work limitations for those with knee sprains performing high physical demand tasks or who have no ability to avoid repeating physically demanding job tasks thought to have resulted in the condition (I) NSAIDs (I) Ice and/or heat (I) Ace wraps and knee braces (I) Course of rehabilitation therapy for those with persisting pain (I) Surgery in isolated Grade III lateral collateral ligament (LCL) tears (I) Surgery in isolated Grade III medial collateral ligament (MCL) tears is usually not necessary because of the documented excellent healing potential of this ligament with closed (i.e., non-operative) treatment. Surgery is only recommended in those rare select cases of failure of non-operative management. (I)	Work limitations for other cases of knee sprains (I) Ultrasound (I) Diathermy (I) Electrical stimulation (I) Iontophoresis (I) Low-level laser therapy (I) Phonophoresis (I) Acupuncture (I) Manipulation, mobilization or manual therapy (I) Autologous blood injections (I) Plasma rich platelet injections (I) Glucocorticosteroid injections (I) Hyaluronic acid injections (I)	Bed rest and knee immobilization – relative rest may be required for many patients (I)
Anterior and Posterior Cruciate Ligament Tears	Rehabilitation after ACL injury with or without surgical reconstruction (C) Home-based physical therapy for post-ACL operative repair patients (C) Perturbation training as part of a comprehensive exercise program in patients with injured ACL with or without surgery (I) Early post-operative rehabilitation after ACL reconstruction surgery (C) Work limitations for ACL tears are usually	Functional bracing for non-operative ACL injuries (I) Work limitations in other cases of ACL tears, particularly where the worker has the ability to modulate work tasks (I) Ultrasound (I) Diathermy (I) Electrical stimulation (I) Iontophoresis (I)	Functional bracing for ACL injuries post-operative (C) Bed rest and knee immobilization – relative rest may be required for most patients (I)

Knee Disorder	Treatment with Evidence Rating/Recommendation Level		
	necessary, especially in the acute phase, although required job demands must be incorporated. Severe cases may be unable to perform any work for a few days. Those performing high physical demand tasks or who cannot avoid repeating physically demanding job tasks similar to those that resulted in the condition are especially recommended to have work limitations. (I) NSAIDs (I) Ice and/or heat (I) Surgical reconstruction of ACL tears for select patients (I)	Low-level laser therapy (I) Phonophoresis (I)	
	Recommended	No Recommendation Acupuncture (I)	Not Recommended
		Manipulation and mobilization or manual therapy (I) Autologous blood injections (I) Plasma rich platelet injections (I) Glucocorticosteroid injections (I) Hyaluronic acid injections (I)	
Meniscal Tears	Work limitations for those with meniscal tears performing high physical demand tasks or those who have no ability to avoid repeating physically demanding job tasks that may have resulted in the condition (I) NSAIDs (I) Ice and/or heat (I) Ace wraps, supports, or sleeves (I) A course of rehabilitation therapy for those with meniscal tears with persisting pain thought to not be clearly surgical (I) Rehabilitation for select patients after meniscal tears without surgical repair (C) Rehabilitation for select patients after meniscal tears with surgical repair (I) Arthroscopic partial meniscectomy for symptomatic, torn menisci for select patients (I)	Work limitations in other cases of meniscal tears (I) Ultrasound (I) Diathermy (I) Electrical stimulation (I) Iontophoresis (I) Low-level laser therapy (I) Phonophoresis (I) Acupuncture (I) Manipulation and mobilization or manual therapy (I) Autologous blood injections (I) Plasma rich platelet injections (I) Glucocorticosteroid injections (I) Hyaluronic acid injections (I)	Bed rest and knee immobilization – relative rest may be required for some patients, particularly those more severely affected (I)
Knee Bursitis	Soft padding of the knee and Ace wraps (I) Modifying activities to avoid kneeling or pressure over the knee and allowing time to reabsorb the fluid (I) Aspiration of a clinically infected or questionably infected bursa (I) Surgical drainage (I) Surgical resection of the bursa for chronic knee bursitis with recurrent drainage (I)	NSAIDs (I) Glucocorticosteroid injections – may be a reasonable option for patients who are failing to resolve prior to consideration of surgery (I)	
Patellar Tendinosis, Patellar	Work limitations for patients with patellofemoral joint pain who perform physically demanding tasks or who have no ability to avoid repeating physically	Work limitations for other cases of patellofemoral joint pain (I)	Bed rest and knee immobilization for patellofemoral joint

Tendinopathy Knee ("Jumpers Knee"), and Anterior Knee Pain	demanding job tasks that have resulted in the condition, especially jumping for patellar tendinosis and stair use for patellofemoral joint pain (I) Recommended NSAIDs for patellofemoral joint pain (I) Ice and/or heat for patellofemoral joint pain (I) Ace wraps, supports or sleeves for patellofemoral joint pain (I) A course of rehabilitation therapy for patellofemoral joint pain for those with persisting pain thought to not be clearly surgical (I) Exercise for patellofemoral joint pain (B) Surgery in patients with anterior knee pain after a 6 month period of failed non-operative treatment provided the patient also has one or more of the following indications: clinical and radiographic evidence of patellar malalignment, clinically and/or radiographically proven subluxation, and/or repeated episodes of patellar dislocation (I) Prolotherapy injections for select patients with chronic patellar tendinopathy (I) Glucocorticosteroid injections for select patients with chronic patellar tendinopathy (C) Aprotinin injections for select patients with chronic patellar tendinopathy (C)	Treatment with Evidence Rating/Recommendation Level Orthotics or knee splints for patellofemoral joint pain (I) No Recommendation Functional bracing for prevention of anterior knee pain (I) Acupuncture for anterior knee pain (I) Ultrasound for patellofemoral joint pain (I) Diathermy for patellofemoral joint pain (I) Iontophoresis for patellofemoral joint pain (I) Low-level laser therapy for patellofemoral joint pain (I) Phonophoresis for patellofemoral joint pain (I) Manipulation and mobilization for anterior knee pain (I) Extracorporeal shockwave therapy for patellar tendinosis (I) Autologous blood injections for patellofemoral joint pain (I) Hyaluronic acid injections for patellofemoral joint pain (I) Platelet rich plasma injections for patellar tendinopathy (I) Autologous blood injections for patellar tendinopathy (I) Polidocanol injections for acute, subacute, or post-operative patellar tendinopathy (I) Percutaneous needle tenotomy for chronic tendinosis (I)	pain – relative rest may be required for some patients, particularly those Not Recommended more severely affected (I) Taping for anterior knee pain (C) Electrical stimulation for anterior knee pain (C) Biofeedback for patellofemoral pain (C) Glycosaminoglycan injections for patellar tendinosis (C)

Table 3. Summary of Recommendations for Pre-, Peri-, and Post-Operative Issues Related to Knee Disorders

Recommended	No Recommendation	Not Recommended
Gabapentin for peri-operative management of pain to reduce need for opioids, particularly in those with adverse effects from opioids (I) NSAIDs for post-operative pain (I) Acetaminophen, particularly for those with contraindications for NSAIDs, for post-operative pain (C) Concomitant prescriptions of cytoprotective medications (proton pump inhibitors or misoprostol) for patients at substantially increased risk for gastrointestinal bleeding (A)	Pre-operative autologous blood donation (I) Manipulation or mobilization for surgical patients (I) Microcurrent therapy for total	Tumor necrosis factor-alpha blockers for treatment of arthroplasty patients with osteolysis (I) Post-operative knee braces for arthroplasty patients (B) Continuous passive motion for routine use for arthroplasty patients.

Recommended	No Recommendation	Not Recommended
Concomitant prescriptions of cytoprotective medications (sucralfate) for patients at substantially increased risk for gastrointestinal bleeding (B) Concomitant prescriptions of cytoprotective medications (H2 blockers) for patients at substantially increased risk for gastrointestinal bleeding (C) Patients with known cardiovascular disease or multiple risk factors for cardiovascular disease should be counseled about the risks and benefits of NSAID therapy (I) Acetaminophen or aspirin should be considered as the first-line therapy for patients with cardiovascular disease risk factors (A) Judicious use of opioids for acute severe postoperative knee pain (I) Cryotherapy for select treatment of knee arthroplasty or other surgery patients (I) Manipulation or mobilization for select postoperative patients with significantly reduced range of motion (I) Manipulation under anesthesia for select postoperative patients with significantly reduced range of motion (I) Interferential therapy for post-operative ACL reconstruction, meniscectomy, and knee chondroplasty immediately post-operatively in the elderly. Patients should be engaged in an appropriate post-operative rehabilitation program in combination with interferential therapy. (C) One-day use of systemic antibiotics for patients undergoing surgical knee procedures (B) Intra-articular glucocorticosteroid injections for select patients after arthroscopy and meniscectomy (C) Autologous blood reinfusion systems for arthroplasty patients (B) Pre-operative educational program prior to arthroplasty (B) Pre-operative exercise program particularly emphasizing cardiovascular fitness and strengthening prior to knee arthroplasty for a select, fairly small minority of patients who exhibit evidence of considerable weakness, debility or unsteady gait. Flexibility components may be reasonable in those without fixed deficits. (I) Post-operative rehabilitation for knee arthroplasty patients (I) Prevention of venous thromboembolic disease for post-operative knee patients, particularly arthroplasty patients or other post-operative patients with prolonged reductions in activity. Early ambulation is recommended. (A) Use of post-operative graded compression stockings for prevention of venous thromboembolic disease (B) Use of lower extremity pump devices for prevention of venous thromboembolic disease (B) Low-molecular weight heparin for prevention of venous thromboembolic disease (A) Factor Xa inhibitors for prevention of venous thromboembolic disease (A)	knee arthroplasty post-operative pain control (I) Routine peri-operative use of bisphosphonates (I) Routine post-operative use of calcitonin (I) Periarticular glucocorticosteroid injections for arthroplasty patients (I) Polidocanol injections for post-operative patellar tendinopathy (I) Specific vocational or avocational pursuits for post-operative knee patients (I)	It may be useful for select, substantially physically inactive patients post-operatively. (C)

Recommended	No Recommendation	Not Recommended
Warfarin and heparin for prevention of venous thromboembolic disease (B) Aspirin for prevention of venous thromboembolic disease (B)		
Cartilage grafting and/or transplantation for select patients (I)		

Definitions:

Strength of Evidence Ratings

A = Strong evidence-base: Two or more high-quality studies*

B = Moderate evidence-base: At least one high-quality study or multiple lower-quality studies** relevant to the topic and the working population

C = Limited evidence-base: At least one study of intermediate-quality

I = Insufficient Evidence: Evidence is insufficient or irreconcilable

*For therapy and prevention, randomized controlled trials (RCTs) or crossover trials with narrow confidence intervals and minimal heterogeneity. For diagnosis and screening, cross sectional studies using independent gold standards. For prognosis, etiology or harms, prospective cohort studies with minimal heterogeneity.

**For therapy and prevention, well-conducted cohort studies. For prognosis, etiology or harms, well conducted retrospective cohort studies or untreated control arms of RCTs.

Strength of Recommendations

Recommendation	Evidence Rating	Description of Category
Strongly Recommended	A	The intervention is strongly recommended for appropriate patients. The intervention improves important health and functional outcomes based on high quality evidence, and the Evidence-Based Practice Panel (EBPP) concludes that benefits substantially outweigh harms and costs.
Moderately Recommended	B	The intervention is recommended for appropriate patients. The intervention improves important health and functional outcomes based on intermediate quality evidence that benefits substantially outweigh harms and costs.
Recommended	C	The intervention is recommended for appropriate patients. There is limited evidence that the intervention may improve important health and functional benefits.
Insufficient - Recommended (Consensus-based)	I	The intervention is recommended for appropriate patients and has nominal costs and essentially no potential for harm. The EBPP feels that the intervention constitutes best medical practice to acquire or provide information in order to best diagnose and treat a health condition and restore function in an expeditious manner. The EBPP believes based on the body of evidence, first principles, or collective experience that patients are best served by these practices, although the evidence is insufficient for an evidence-based recommendation.
Insufficient - No Recommendation (Consensus-based)	I	The evidence is insufficient to recommend for or against routinely providing the intervention. The EBPP makes no recommendation. Evidence that the intervention is effective is lacking, of poor quality, or conflicting and the balance of benefits, harms, and costs cannot be determined.
Insufficient - Not Recommended (Consensus-based)	I	The evidence is insufficient for an evidence-based recommendation. The intervention is not recommended for appropriate patients because of high costs or high potential for harm to the patient.
Not Recommended	C	Recommendation against routinely providing the intervention. The EBPP found at least intermediate evidence that harms and costs exceed benefits based on limited evidence.

Recommendation	Evidence Rating	Description of Category
Moderately Not Recommended	B	Recommendation against routinely providing the intervention to eligible patients. The EBPP found at least intermediate evidence that the intervention is ineffective, or that harms or costs outweigh benefits.
Strongly Not Recommended	A	Strong recommendation against providing the intervention to eligible patients. The EBPP found high quality evidence that the intervention is ineffective, or that harms or costs outweigh benefits.

Clinical Algorithm(s)

The following clinical algorithms are provided in the original guideline document:

- ACOEM Guidelines for Care of Acute and Subacute Knee Disorders
- Initial Evaluation of Knee Disorders
- Initial and Follow-up Management of Knee Disorders
- Evaluation of Slow-to-Recover Patients with Knee Disorders (Symptoms >4 Weeks)
- Surgical Considerations for Patients with Anatomic Evidence of Ligament Tears and Persistent Knee Symptoms
- Further Management of Knee Disorders
- Management of Ligament Tears and Osteoarthrosis for Patients with Knee Symptoms
- Management of Knee Osteonecrosis

Scope

Disease/Condition(s)

Knee disorders

Guideline Category

Diagnosis

Evaluation

Management

Rehabilitation

Treatment

Clinical Specialty

Family Practice

Internal Medicine

Orthopedic Surgery

Physical Medicine and Rehabilitation

Preventive Medicine

Surgery

Intended Users

Advanced Practice Nurses

Allied Health Personnel

Health Care Providers

Occupational Therapists

Physical Therapists

Physician Assistants

Physicians

Utilization Management

Guideline Objective(s)

- To describe evidence-based best practices for key areas of occupational medical care and disability management
- To improve or restore the health of workers with occupationally related illnesses or injuries
- To improve the quality of occupational medical care and disability management

Target Population

Adults with potentially work-related knee disorders seen in primary care settings

Interventions and Practices Considered

Diagnosis/Evaluation

1. Antibody levels
2. Arthroscopy
3. Bone scans
4. Computerized tomography (CT)
5. C-reactive protein, erythrocyte sedimentation rate, other inflammatory markers
6. Local anesthetic injections
7. Electromyography (including nerve conduction studies)
8. Magnetic resonance imaging (MRI)
9. Magnetic resonance arthrogram
10. X-rays
11. Saline load test
12. Ultrasound
13. Fluid aspiration

Management/Treatment

1. Activity modification/exercise
    - Canes or crutches to advance activity level
    - Bed rest/non-weight bearing
    - Aerobic exercise
    - Stretching exercises
    - Strengthening, endurance, and aerobic exercises
    - Fear avoidance belief training
2. Medications
    - Non-steroidal anti-inflammatory drugs
    - Acetaminophen
    - Cytoprotective medication (proton pump inhibitors, misoprostol, H2 blockers)

- Aspirin
- Opioids
- Antidepressants for chronic pain with co-morbid depression
- Glucocorticosteroid injections
- Prolotherapy injections
- Aprotinin injections
- Management of peri-operative pain
- Peri-operative antibiotic prophylaxis
- Prevention of peri-operative venous thrombotic disease

3. Physical methods
    - Heat therapy
    - Manipulation/mobilization
    - Aquatic therapy
    - Off-loader braces
    - Knee braces
    - Cryotherapy
    - Acupuncture
    - Ace wraps
    - Progressive agility, trunk stabilization, icing
    - Ice/heat
    - Perturbation training
    - Soft padding
4. Percutaneous electric therapy
5. Motorized scooter
6. Viscosupplementation injections
7. Surgery
    - Knee arthroplasty
    - Bilateral knee replacement
    - Reconstruction of anterior cruciate ligament tears
    - Partial meniscectomy
    - Surgical drainage
    - Resection of the bursa
8. Rehabilitation (work conditioning/work hardening)
9. Behavioral interventions
    - Cognitive behavioral therapy
    - Psychological evaluation
10. Patient education

Major Outcomes Considered

- Time to return to work
- Symptom relief

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Searches for evidence for the development of American College of Occupational and Environmental Medicine (ACOEM) evidence-based products and services primarily emphasize a search for high- or moderate-quality original studies. Primary databases searched were:

- The National Library of Medicine's MEDLARS database (Medline) (www.nlm.nih.gov)
- EBM Online (www.bmjjournals.com)
- The Cochrane Central Register of Controlled Trials (http://www.thecochranelibrary.com/view/0/index.html)
- TRIP Database (www.tripdatabase.com)
- CINAHL (Nursing, allied health, physical therapy, occupational therapy, social services: http://www.cinahl.com/wpages/login.htm)
- EMBASE (www.embase.com/)
- PEDro (www.pedro.fhs.usyd.edu.au/)

Ranking and Preliminary Screening of Studies

Primary sources selected for inclusion in the evidence base for American College of Occupational and Environmental Medicine (ACOEM) products and services are limited to those with the strongest apparent study design, pending quality rating. The strength and quality of study design are determined by ranking and rating of the studies according to accepted methods. Generally accepted ranking of study design for diagnostic testing and clinical treatment methods were modified by the Guideline Methodology Committee (GMC). Systematic reviews in general are not ranked as the best design in reality, as most reviews located during pilot testing of the Methodology, with the exception of many (but not all) Cochrane reviews, did not use systematic searches or quality assessments of included studies. The GMC also excluded level 4 evidence from consideration (case series, poor-quality cohort studies, poor-quality case-control studies, expert opinion without explicit critical appraisal, and expert opinion based on physiology, bench research, first principles). The focus was on the best-designed original studies, pending quality grading. For example, studies of diagnostic tests are generally limited to those compared to an acceptable gold standard, and those reporting sensitivity and specificity. Studies of clinical treatment methods are generally limited to randomized controlled trials or crossover trials. Additional literature was also reviewed when there was a paucity of higher-grade literature or if it was brought to Evidence-based Practice Panel's (EBPP's) attention from interested parties.

To narrow the data discovered in the search to that which will be acceptable for further analysis and quality rating, researchers use additional preliminary screening criteria for original research.

Criteria for Inclusion in Study Rating and Critical Analysis of Studies of Diagnosis/Clinical Assessment Methods

1. Evaluate the efficacy (i.e., clinical accuracy) of the assessment method (i.e., the "test") in a group that contains subjects both with and without the condition the test is intended to assess.
2. Be a prospective cohort study or an arm of a randomized controlled trial (RCT).
3. Compare the findings of the assessment method (test) to an adequate reference standard for all subjects (not just subjects who tested positive).

Criteria for Inclusion in Study Rating and Critical Analysis of Studies of Treatment Efficacy

1. Evaluate a group of subjects with a representative spectrum of the clinical condition of interest.
2. Be an RCT evaluating clinical outcomes in a group receiving the intervention compared to a comparison group receiving either no intervention or a different intervention.
3. Evaluate functional outcomes that are important to a patient’s overall health or well being or are important to society.

Searches are documented, listing the database searched, the search terms, article type and limits, the time frame searched (in this case, all years in the databases), the number of studies found, the number reviewed in detail, and the number included in the systematic analysis. Despite multiple database searches, many additional studies are discovered in exhaustive manual searches of article reference lists.

Number of Source Documents

Not stated

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Strength of Evidence Ratings

A = Strong evidence-base: Two or more high-quality studies*

B = Moderate evidence-base: At least one high-quality study or multiple lower-quality studies** relevant to the topic and the working population

C = Limited evidence-base: At least one study of intermediate-quality

I = Insufficient Evidence: Evidence is insufficient or irreconcilable

*For therapy and prevention, randomized controlled trials (RCTs) or crossover trials with narrow confidence intervals and minimal heterogeneity. For diagnosis and screening, cross sectional studies using independent gold standards. For prognosis, etiology or harms, prospective cohort studies with minimal heterogeneity.

**For therapy and prevention, well-conducted cohort studies. For prognosis, etiology or harms, well conducted retrospective cohort studies or untreated control arms of RCTs.

Methods Used to Analyze the Evidence

Review of Published Meta-Analyses

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

Study Assessment and Quality Rating

Studies are first abstracted into evidence tables for easier assessment. See Appendix B in the methodology companion (see the "Availability of Companion Documents" field) for a sample of an evidence table for treatment studies. Each study is formally graded for quality using a modification of the most recent assessment scheme proposed by the Cochrane Collaboration Back Group, as shown in the table below. The studies are quality rated using a 0, 0.5, 1 grade for each item, where 0 = does not fulfill the requirement; 0.5 = partially fulfills the requirement and 1 = entirely fulfills the requirement. A study with a score less than 4.0 is rated as a poor-quality study; a study with a score between 4.0 and 7.5 is rated as a moderate-quality study. A study with a score of 8.0 or greater is rated as a high-quality study.

Rating Criteria for Randomized Controlled Trials of Treatment Studies

Criterion	Description
Randomization	Assessment of the degree that randomization was both reported to have been performed and successfully achieved through analyses of comparisons of variables between the treatment and control groups
Treatment allocation concealed	Concealment of the allocation of patients to various arms of the study from all involved, including patients, clinicians, and researchers
Baseline comparability	Measures how comparable the baseline groups are (e.g., age, gender, prior treatment)
Patient blinded	The patient is not aware which group he or she is in
Provider blinded	The provider is not aware which treatment he or she is delivering
Assessor blinded	The researcher is not aware which group the results apply to
Co-interventions avoided	The degree to which the study design avoided multiple interventions at the same time

Criterion	Description
Compliance acceptable	Measures the degree of noncompliance with the treatment protocol
Dropout rate	Measures the dropout rate at different periods of time
Timing of assessments	Assessments and reassessments should be performed at the same time from inception for all study groups
Analyzed by intention to treat	Whether the study data was analyzed with an "intention to treat" analysis

Methods Used to Formulate the Recommendations

Expert Consensus

Expert Consensus (Nominal Group Technique)

Description of Methods Used to Formulate the Recommendations

Each recommendation includes citations of the specific scientific literature which supports the recommendation. The recommendations explicitly consider the health benefits, side effects, and risks of the proposed recommendation. Recommendations include the data elements described below.

Content of Recommendations for Diagnostic Testing or Treatment

1. The diagnoses for which the test or treatment is indicated
2. The specific indications for the test or treatment
3. The point in the time course of the problem for which it is appropriate
4. Prior conservative treatment that should be tried first
5. Relative and absolute contraindications to the test or procedure
6. The number of tests or procedures that are appropriate at a given time in the course of the problem
7. The potential benefits of the test or procedure
8. The potential harms, including effects on disability and return to work

The Evidence-based Practice Panels (EBPPs) for each topic area review and discuss draft practice recommendations from the research staff that includes a review of the quality evidence, evidence tables, and summaries. The strength of evidence rating is confirmed by the EBPP responsible for the topic, with review by the Guideline Methodology Committee (GMC). EBPP members may present additional comments related to their clinical opinions and experience for panel consideration. If a unanimous decision is not possible, an EBPP may vote on the rating of the strength of the evidence to determine a consensus. Dissenters to the consensus may draft minority opinions about the strength of evidence. In practice, this has not happened as recommendations have been unanimous.

Formulation of recommendations requires clinical judgment as well as a full evaluation and consideration of the available high-quality evidence. To aid in framing recommendations, the GMC developed a list of "First Principles" based on the Hippocratic Oath ("First Do No Harm"), medical logic, appropriate sequencing and case management, shared decision-making, support of functional recovery, and relative cost-effectiveness. The First Principles are defined in Table 7 in the methodology companion (see the "Availability of Companion Documents" field). When there is insufficient high-quality evidence of effectiveness or efficacy, or the high-quality evidence is conflicting, and to guide recommendations for alternative tests or treatments when there are several options, these principles are used to guide group decision-making.

The EBPPs then assign a Strength of Recommendation to each recommendation. If a consensus cannot be reached on the recommendation or strength of recommendation, the EBPPs may use nominal group voting if agreement is not possible in the discussion. Once a consensus is reached, the EBPPs will finalize the language and strength rating of the recommendation. If needed and material, a minority opinion can be appended to the recommendation.

Rating Scheme for the Strength of the Recommendations

Strength of Recommendations

Recommendation	Evidence Rating	Description of Category
Strongly Recommended	A	The intervention is strongly recommended for appropriate patients. The intervention improves important health and functional outcomes based on high quality evidence, and the Evidence-Based Practice Panel (EBPP) concludes that benefits substantially outweigh harms and costs.
Moderately Recommended	B	The intervention is recommended for appropriate patients. The intervention improves important health and functional outcomes based on intermediate quality evidence that benefits substantially outweigh harms and costs.
Recommended	C	The intervention is recommended for appropriate patients. There is limited evidence that the intervention may improve important health and functional benefits.
Insufficient - Recommended (Consensus-based)	I	The intervention is recommended for appropriate patients and has nominal costs and essentially no potential for harm. The EBPP feels that the intervention constitutes best medical practice to acquire or provide information in order to best diagnose and treat a health condition and restore function in an expeditious manner. The EBPP believes based on the body of evidence, first principles, or collective experience that patients are best served by these practices, although the evidence is insufficient for an evidence-based recommendation.
Insufficient - No Recommendation (Consensus-based)	I	The evidence is insufficient to recommend for or against routinely providing the intervention. The EBPP makes no recommendation. Evidence that the intervention is effective is lacking, of poor quality, or conflicting and the balance of benefits, harms, and costs cannot be determined.
Insufficient - Not Recommended (Consensus-based)	I	The evidence is insufficient for an evidence-based recommendation. The intervention is not recommended for appropriate patients because of high costs or high potential for harm to the patient.
Not Recommended	C	Recommendation against routinely providing the intervention. The EBPP found at least intermediate evidence that harms and costs exceed benefits based on limited evidence.
Moderately Not Recommended	B	Recommendation against routinely providing the intervention to eligible patients. The EBPP found at least intermediate evidence that the intervention is ineffective, or that harms or costs outweigh benefits.
Strongly Not Recommended	A	Strong recommendation against providing the intervention to eligible patients. The EBPP found high quality evidence that the intervention is ineffective, or that harms or costs outweigh benefits.

Cost Analysis

The guideline developers reviewed published cost analyses.

Method of Guideline Validation

Clinical Validation-Pilot Testing

External Peer Review

Internal Peer Review

Description of Method of Guideline Validation

Internal Quality Review

The Guideline Methodology Committee (GMC) assigns a committee member to each Evidence Based Practice Panel (EBPP) as a methodology consultant to assist with adherence to this methodology. The GMC reviews all recommendations for which there are questions about consistency with the defined methodology. If the GMC determines that the approved methodology has not been followed, leading to illogical or untenable recommendations, the GMC engages in direct discussions with the EBPP to reach agreement on revision. If there is no agreement or revision, then the matter will be considered by the American College of Occupational and Environmental Medicine (ACOEM) Board of Directors when the document is submitted for Board review.

External Review

ACOEM conducts external peer review of the ACOEM *Occupational Medicine Practice Guidelines* (APGs) and periodic revisions to 1) assure that all relevant high-quality scientific literature has been found, 2) assure that the important evidence from the relevant scientific literature has been accurately interpreted, 3) solicit opinions on whether the findings and recommendation statements are appropriate and consistent with the evidence, and 4) obtain general information on the conclusions and presentation of materials from external topic experts. Professional and patient organizations, as well as panel members, ACOEM Board of Directors, etc., are invited to nominate external peer reviewers.

Peer reviewers are asked to comment on the completeness of the scientific literature evaluation in their topic area, the clarity and technical accuracy of the APGs evaluation and summary of the evidence, and the appropriateness of the Guideline findings and recommendation statements.

Stakeholder Input

In a cyclical manner, ACOEM will seek stakeholder input to understand the needs and preferences of those who may utilize or be affected by the use of clinical practice guidelines in workplace settings and in the workers' compensation system. ACOEM solicits input from clinicians, health care systems, workers or patients, employers, utilization reviewers, case managers, insurers and third party administrators, attorneys, regulators, and policy makers through a variety of mechanisms. Stakeholders will be asked for comments about their experience using existing clinical practice guidelines and related products and their suggestions for future improvements. They are also asked for input on the use of clinical practice guidelines in clinical care, case management, claim administration, claim adjudication, and in the development of policies and regulations.

To ensure editorial independence in the development process, the stakeholder groups will be asked for input about the APGs, but will not be informed of panel deliberations or shown drafts of practice recommendations before the formal release of the documents. In some cases, a member of a stakeholder group may participate as a member of a Guideline EBPP or may participate in peer review or pilot testing. However, all individuals involved in the APGs development, peer review, and pilot testing are asked to keep all information about the panel's deliberations and conclusions confidential until the APGs are formally released.

Pilot Testing

The guidelines are pilot tested to determine if the recommendations are clear, easy to use, and are generally useful. Pilot testers are not asked if they think the recommendations or process for development was appropriate.

Review by the GMC and the ACOEM Board of Directors

During the entire evidence-based product development process, the GMC will work with the Panels, editors, and research staff to ensure that the evidence-based product methodology is being followed, both in the literature evaluation process and development of conclusion and recommendation statements. The Board of Directors has an opportunity to comment on the Guidelines during the external review period. Their comments are reviewed by the Panel and any necessary changes are made to the Guidelines.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

- Improved efficiency of the diagnostic process including identification of red flags
- Effective treatment resulting in symptom alleviation and cure

Potential Harms

- False-positive or false-negative diagnostic tests
- Risks and complications of surgical procedures and imaging studies (e.g., infection, radiation)
- Acetaminophen carries the risk of hepatic toxicity, particularly among those consuming excessive alcohol.
- Gastrointestinal bleeding and possible increased cardiovascular risk are associated with non-steroidal anti-inflammatory drugs (NSAIDs).
- Adverse effects from opioids are significant. It is estimated that 20% to 87% of patients on opioids suffer from adverse effects, with an estimated 2 adverse effects per patient. There is a trend toward higher adverse event rates with more potent opioids, although studies are not consistent.
- Devices/aids might be detrimental, as they may discourage therapeutic physical activity.
- For chronic knee pain, crutches may paradoxically increase disability through debility. In those circumstances, institution or maintenance of advice for crutch or cane use should be carefully considered against potential risks.
- Anti-thrombolytic agents carry the risk of bleeding.

Contraindications

Contraindications

- Aggressive stretching may be contraindicated if symptoms (e.g., pain and/or swelling) are substantially aggravated. It is also important for patients to understand that, while exercises after surgery may cause some discomfort, they should not cause significant increases in pain or new onset of increased swelling.
- Contraindications to magnetic resonance imaging (MRI) include implanted metallic-ferrous devices.
- Intra-articular knee viscosupplementation injections: The occurrence of an inflammatory joint reaction (sometimes called a "pseudoseptic reaction," generally treated with non-steroidal anti-inflammatory drugs [NSAIDs], ice, joint aspiration and evaluated with studies for infection and crystals) is considered by some to be a relative, but not an absolute, contraindication to another injection.

Qualifying Statements

Qualifying Statements

The American College of Occupational and Environmental Medicine (ACEOM) provides this segment of guidelines for practitioners and notes that decisions to adopt particular courses of actions must be made by trained practitioners on the basis of the available resources and the particular circumstances presented by the individual patient. Accordingly, the ACOEM disclaims responsibility for any injury or damage resulting from actions taken by practitioners after considering these guidelines.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Implementation Tools

Clinical Algorithm

Mobile Device Resources

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

Bibliographic Source(s)

Knee disorders. In: Hegmann KT, editor(s). Occupational medicine practice guidelines. Evaluation and management of common health problems and functional recovery in workers. 3rd ed. Elk Grove Village (IL): American College of Occupational and Environmental Medicine (ACOEM); 2011. p. 1-503. [2243 references]

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

1997 (revised 2011)

Guideline Developer(s)

American College of Occupational and Environmental Medicine - Medical Specialty Society

Source(s) of Funding

American College of Occupational and Environmental Medicine

Guideline Committee

Evidence-based Practice Knee Panel

Composition of Group That Authored the Guideline

Panel Members: Ethan Lichtblau, MD, FRCS(C) (*Chair*); David B. Coward, MD; Stephen Miller Howell, MD; Clark D. Iorio, DO; David S. Logerstedt, PT, MPT, MA, SCS; Frederic G. Nicola, MD; Kaochoy Saechao, MD, MPH; June T. Spector, MD, MPH

Financial Disclosures/Conflicts of Interest

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National, Regional, Local Committee Affiliations—Member Executive Committee, Quebec Orthopedic Association

Guidelines Related Professional Activities—Member, Guidelines Panels for Santa Cabrini Hospital: Use of anticoagulation post total joint replacement, use of anticoagulation post hip fracture surgery, evaluation of proper candidates for hip resurfacing, and evaluation of proper candidates for volar wrist plating post distal radius fracture

Research Grants/Other Support—None

Financial/Non-Financial Conflict of Interest—None

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National, Regional, Local Committee Affiliations—None

Guidelines Related Professional Activities—None

Research Grants/Other Support—On-going research: patellofemoral disorders following arthrotomy of the knee; anterior cruciate ligament reconstruction in the dog – intra-articular freeze dried fascia lata graft evaluation; development of a mechanical testing device to measure anterior-posterior displacement of the tibial femoral joint in the dog; the 45 degree weight bearing anteriorposterior PA radiograph in evaluation of the knee; arthroscopic synovectomy in rheumatoid arthritis; arthroscopic synovectomy in hemophilia; patterns of meniscal tears in acute anterior cruciate ligament deficient knees; anterior cruciate ligament tears in the female athlete; and prevention of ACL tears in the female athlete

Financial/Non-Financial Conflict of Interest—None

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National, Regional, Local Committee Affiliations—Editorial Board, *American Journal of Sports Medicine*; Editorial Board, *American Journal of Knee Surgery*; Reviewer, *Journal of Bone and Joint Surgery*; Reviewer, *Knee Surgery Sports Traumatology Arthroscopy*; Reviewer, *Journal of Orthopedic Research*; Reviewer, *American Shoulder and Elbow Surgeons*; Reviewer, *Clinical Orthopedics and Related Research*

Guidelines Related Professional Activities—None

Research Grants/Other Support—None

Financial/Non-Financial Conflict of Interest—None

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Guidelines Related Professional Activities—Developed clinical pathways and guidelines, Provena United Samaritan Medical Center; developed clinical pathways and guidelines, MedCentral Rapid Response, Workable

Research Grants/Other Support—None

Financial/Non-Financial Conflict of Interest—None

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Guidelines Related Professional Activities—Member, ICF-Based Practice Guidelines Project-Knee Disorders, Orthopaedic Section, American Physical Therapy Association

Research Grants/Other Support—Promotion of Doctoral Studies I, American Physical Therapy Association

Financial/Non-Financial Conflict of Interest—None

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Guidelines Related Professional Activities—Developed guidelines for Fitness for Duty USN (1991)

Research Grants/Other Support—None

Financial/Non-Financial Conflict of Interest—None

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Guidelines Related Professional Activities—None

Research Grants/Other Support—None

Financial/Non-Financial Conflict of Interest—None

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National, Regional, Local Committee Affiliations—None

Research Grants/Other Support—From 2008-July 1, 2010, received stipend support from the Occupational Physicians Scholarship Fund; currently receive support from the National Institute of Environmental Health Sciences (grant# T32 ES015459)

Financial/Non-Financial Conflict of Interest—None

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Knee complaints. Elk Grove Village (IL): American College of Occupational and Environmental

Medicine (ACOEM); 2004. 31 p. [87 references]

Guideline Availability

Electronic copies: To order a subscription to APG-I, the online version of the Guidelines, call 847-818-1800 or visit http://www.acoem.org/apg-i.aspx.

Print copies are available from the American College of Occupational and Environmental Medicine (ACOEM), 25 Northwest Point Boulevard, Suite 700, Elk Grove Village, IL 60007 by calling 847-818-1800 or order online at http://www.acoem.org/PracticeGuidelines.aspx.

Subscriptions to ACOEM's Practice Guidelines App are available for iPhone/iPod and iPad interfaces from the iTunes Web site.

Availability of Companion Documents

The following is available:

- Methodology for the update of the occupational medicine practice guidelines, 2nd edition. Elk Grove Village (IL): American College of Occupational and Environmental Medicine (ACOEM); 2008. Available from the ACOEM Web site.

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI on May 31, 2006. The information was verified by the guideline developer on November 3, 2006. This NGC summary was updated by ECRI Institute on July 20, 2012. The updated information was verified by the guideline developer on August 6, 2012. This summary was updated by ECRI Institute on October 28, 2013 following the U.S. Food and Drug Administration advisory on Acetaminophen. This summary was updated by ECRI Institute on March 10, 2014 following the U.S. Food and Drug Administration advisory on Low Molecular Weight Heparins. This summary was updated by ECRI Institute on September 18, 2015 following the U.S. Food and Drug Administration advisory on non-aspirin nonsteroidal anti-inflammatory drugs (NSAIDs). This summary was updated by ECRI Institute on June 2, 2016 following the U.S. Food and Drug Administration advisory on Opioid pain medicines.

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